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THE URBAN TRANSPORTATION PROBLEM: A GENERAL DISCUSSION ¹

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A study of the transit facilities of the larger American cities, shows that while great advances have been made in the art of transportation, much remains to be accomplished. Nearly every city encounters a different traction problem, and many of them are pressing for some immediate solution. In the majority of cases, what is wanted is not only considerable improvement over present conditions, but also a program of development along technical, legal and financial lines which will result in a comprehensive transportation system suitable to meet constantly growing demands.

The term "comprehensive plan" is used so frequently that it may be worth while to define the conditions which such a plan should fulfil. In doing this, it will be discovered at once that there are many points of view, and equally as many opinions as to the relative importance of the elements which enter into the specifications for an ideal system of transportation. In considering the subject, the rights of the patron, the operator, the municipality, the property owner and the financier must each be recognized as well as the requirements for maximum economy.

The patron of the system believes he has a right to expect adequate services, consisting of plenty of cars provided with cross seats, comfortably heated in cold weather and well ventilated at all times. Every precaution should be adopted for his safety, and after safety and comfort has been secured, the maximum possible speed should be the next consideration. The rolling stock should be noiseless in operation, and the track, special work and car equipment should be built for easy riding. Through riding from point of starting to point of destination is desirable, but if this is possible, the patron

¹This paper is one chapter of a report recently prepared by Mr. Arnold for the city of Pittsburgh, Pa., upon the traffic conditions of that city.—[EDITORS.]

has a right to expect universal transfers and one fare for the entire system.

The operator of the system can secure the best results if the equipment is efficient and up-to-date, if the construction has been sufficiently substantial to reduce maintenance to the most economical point, if the track and paving have been built so as not to encourage vehicles to follow the rail, and if street traffic is so regulated that the surface cars will have the right of way, particularly during the rush hours.

The most favorable conditions for operation exist when the peak loads are not excessive, when there is a large amount of all day travel, when the flow of traffic is not all one way so that the cars may be evenly filled in both directions, and when the profit of the short haul business more than offsets the losses from the long hauls.

The City is best served if the passengers are collected and delivered convenient to places of business; and the system should carry passengers to the outlying districts in the minimum of time and at the lowest cost, so as to reduce the tendency toward congestion in down-town districts. Rapid transit should be provided by well-ventilated subways or by means of roads in open cuts, or upon elevated structures designed to present an agreeable appearance and to operate with a minimum of noise. Suburban traffic should be handled by electrified terminal systems of the various steam roads so as to avoid smoke and gases. The street railway surface system should furnish and maintain the pavement between and adjacent to its tracks; and it should sprinkle the streets and reconstruct its roadbed whenever the streets are torn up for changes in grade, alterations in pavement, new sewers or water mains. Free transportation should be supplied to mail carriers, firemen, policemen and other city employees, and special low rates should be made for school children and workmen. Iron poles should be removed upon request and all transmission and feeder cables should be placed underground. In certain cities and in restricted districts of other cities the underground conduit system is insisted upon. The franchise should be indeterminate so that "franchise values" will be eliminated, and a system of supervising regulation should be established to insure that the citizens get their full measure of service.

The real estate owner and operator often insists upon the best

facilities being provided for his immediate district, even at the expense of the remainder of the city. The owner of property in the central part of the city will point out the advantages of confining the growth of the city by restricting non-paying extensions and by charging two or more fares to reach the outlying districts; while the development of the suburban districts and the building up of home communities inside the city limits depends largely upon extensions of rapid transit facilities and the maintaining of the universal five-cent fare.

Financial requirements will dictate that the rate of fare be sufficient to cover the expense of transportation, maintenance, reserve for depreciation and damages, as well as to pay interest charges and a fair return on the investment. If there be any surplus, the excess earnings should be devoted to better service and extensions, or it should be divided with the city in lieu of taxes, franchise payments or other civic burdens.

In considering rates, credit should be allowed for past burdens of non-paying years and for development expenses involved in creating, combining and building up the property and in bringing it to a paying basis. Extraordinary expenses should be amortized, and reserves for replacement of equipment, personal damages, fires and other contingencies should be provided.

A broad economical policy requires that the whole transportation system of a district should be controlled as if under one ownership, and that when one system of transportation more efficient than another can be provided, a transfer of passengers should be encouraged from the less to the more efficient system. Transportation in a city is a natural monopoly, therefore no district should be served with two competing transit systems when one can furnish better service than with the business divided.

The building of extensions into undeveloped districts should be assisted by assessment on the property benefited, and the operating loss on non-paying lines should be financed so as not be too heavy a burden upon the remainder of the system. As districts develop, the improvement of transit facilities should be somewhat in advance of the actual requirements.

The problem, therefore, is how to find an equitable balance between all these conditions. There is to be provided a maximum of safety, comfort, speed and capacity. Pavements are to be re-

paired, taxes are to be paid, all equipment must be thoroughly maintained and a reserve fund accumulated so as to keep the property abreast of all advances in the art. Separate systems must be controlled or combined to avoid wasteful competition and to secure the efficiency of a central management. Extensions must be made into promising territory. Rapid transit systems should be provided for and built in advance of immediate needs, and the losses during the first years of operation must be financed. If private capital is to be attracted for building the transit systems, a return on the investment somewhat larger than the current rates of interest should be allowed.

There are so many elements arising from local conditions that it would be impracticable to develop a formula that would be universally applicable, and while comparisons between different cities will be instructive, the solution of *any one problem* must be preceded by a study of the relative importance of its elements as determined by the special requirements of the given locality. In each case it is desirable to determine what constitutes a fair requirement as regards the following items:

1. Original investment.
2. Legal, technical and financial development expenses.
3. Working capital.
4. Adequate service.
5. Possible income.
6. Operating and maintenance expense.
7. Taxes and franchise payments.
8. Reserve funds for insurance, damages and depreciation.
9. Return on investment.
10. Provision for future extensions.
11. Facilities for rapid transit.

Transit facilities may be called the blood vessels of the city or district, and it is only by providing for unrestricted flow of traffic from any one district to every other district that we have the most favorable conditions for strength and growth. Hamper this free intercourse by poor transit facilities, and at once there is an arrested development. On the other hand, if facilities are extended too far and too fast, there follows a dissipation of strength. What is always wanted is to find an equitable balance, and then a constructive program which will *continuously maintain* this balance.

Present Tendencies

It may be of benefit to indicate briefly the present tendencies which are more or less marked in the movement for transit betterments. There is a decided tendency, for instance, toward recognizing the *actual investment required to provide adequate service*. This tendency is shown by the valuations of traction properties which are now under way by various authorities and by the studies that are being made by engineers to determine not only the first cost and the "cost to reproduce" certain properties, but the probable additional expenses which have been involved in building up the property and securing a good business. It is hard to see how the problem of reorganization and of rate making can be fairly handled without making a fair valuation of the reproduction cost, and, in some cases, of the depreciated or present value.

There appears to be a constantly growing sentiment in favor of building *extensions into new territory by means of assessment*; that is, charging the property benefited with at least the cost of the permanent way. This method of financing branch lines which will be operated at a loss for some time, has been worked out in Berlin in connection with the underground road, and petitions are now being signed in certain districts of New York which are likely to result in its adoption in this country.

There is also a gradual tendency toward a *higher standard of service*. Better lighted, better heated and more comfortable cars are in demand and a limit to the crowding allowed is resulting in more adequate service. While it is generally recognized in this country that a seat for every passenger is impracticable during rush hours, knowledge of the fact that such a policy is possible in foreign cities seems to justify the more insistent demands for more seats here at the time passengers wish to travel, although the enforcement of the policy abroad somewhat inconveniences passengers by causing them to wait longer for cars.

Fares

There has been some demand for *three-cent fares*, especially in the middle west, and experiments have recently been made to demonstrate the feasibility of the fare. The result, however, has been rather to prove that cheap fares and good service cannot be

secured at the same time, and the conclusion has been reached that, as a rule, the rider wants good service and is willing to pay reasonably for it.

On the other hand, the movement to *raise the city fare* above the five-cent limit has received little encouragement, and there seems to be no decided sentiment in this country in favor of the European zone system. It appears that a decided effort must be made to work out our transit system problems on a basis of a single five-cent fare for a ride in one general direction. And it will probably only be when failure to do this, due to excessive length of average haul, has been demonstrated, that it will be advisable to consider raising the fare above five cents. Then it will probably come in the form of making a small charge for certain transfers. In other words, of all the possible solutions, the augmenting of income by universally charging more than five cents for a ride within the city limits would appear to be one of the last suggestions to be considered.

An effort has been made in certain cases to increase income by *abolishing transfers*, but there is a question as to the benefits to be derived from such a course. The *abuse* of the transfer privilege should rather be eliminated. Its intelligent *use* always has been a logical and economical method of handling and increasing traffic. The tendency should be toward one comprehensive system with consistent facilities between the different branches. If the collection and distribution of passengers can be accomplished more conveniently and economically by means of the transfer than by means of the "*direct*" system, which often means the duplication of service, then the transfer system should have the preference.

When it is understood that the operating expenses per car mile are from three-quarters to one-half as much for a car in a subway or an elevated structure as upon the street surface, and that at the same time the subway or elevated car runs at fully double the speed and carries at least fifty per cent more seats, it will be seen that, as far as operating expenses are concerned, rapid transit subway and elevated lines have a great advantage. The problem is to *secure sufficient business* to run enough car miles over the more expensive structure so that the fixed charges *per car mile*, or seat mile, will not be excessive. As a rule, any subway or elevated system will not prove financially successful unless the traffic warrants

running during any year, car miles equal in amount to at least half the investment in dollars than in the property (that is, an investment of two dollars for each car mile on a yearly basis). Experience is gradually showing us that there are economical limits—both high and low—between which a certain density of traffic will justify a corresponding transportation system; beyond these limits some other system should be provided. For instance, in Boston, when the surface system became congested with traffic in the down-town districts, it was found more economical to transfer passengers to an elevated structure. In the course of time, as traffic increased, it was found desirable to extend the limits of the elevated road zone and to use subways. The same conclusions are being reached in Brooklyn, where, as in Boston, the elevated and surface roads are both under one management. In other words, a unit system of construction is naturally being developed together with a *zone system of operation rather than a zone system of fares*. But this is only possible when the entire transportation system is practically under one control.

Short Haul and Density

The fact that the operating expense per car mile of the surface lines is greater than the cost of operating a mile through a subway or on an elevated line, naturally leads to a more serious study of the possible economies in surface line operation. Progress in this direction shows a decided movement to reduce the relative weight of the car per seat, resulting in lower power costs and less annual cost of maintenance of roadway. At the same time, the income is being increased and conserved by the introduction of improved fare collecting systems. There remains to be devised, however, some system of operation on the surface lines for the handling of *short haul passengers in short haul cars*. There is a large profit in all of our cities from the short haul business. But as a rule, it is now being handled in cars which run practically to the end of the various lines so that much of the advantage of the short haul profits is offset by the expense of operating cars with empty seats in the outlying districts.

It must be recognized that there are two things which reduce the cost of transportation per passenger—one is density of traffic and the other, short haul. In Paris, the subway system is a paying investment, because the average haul is less than two miles and

the cars are operated over comparatively short lines. Universal free transfers are provided over the entire system but the lines are not physically connected and the densest traffic is handled by trains running over six miles, at the end of which distance they are looped back. On the other hand, the present subway in New York furnishes a continuous ride of seventeen and one half miles for one fare, while the average passenger travel is about five miles. Taking into consideration the relative purchasing value of money in New York and in Paris, a comparison of the two cities shows that in the Paris subway, the fare is equivalent to four cents for an average ride of two miles or at the rate of *two cents per mile*, while in New York, the fare is five cents for an average ride of five miles, or at the rate of *one cent per mile*. On a mile basis, therefore, New York gets its subway transportation at half the Paris rate, but the New Yorker travels more than twice as far on each ride as the Parisian, so that the average fare *per passenger* is greater in New York than in Paris. New York has the advantage of density of traffic; Paris has the advantage of short haul. New York should cultivate the short haul business in short haul cars as is done in Paris and thus enjoy the benefits of both elements—short haul and density of traffic—and thus be relieved of the present uncomfortable overcrowding in the short haul district which now seems necessary in order to secure the very long rides for a universal five-cent fare.

Taxes

The question of taxation is being more carefully analyzed and it is recognized by some students of transportation problems, that perhaps the railroads have been called upon to carry more than their share of the tax burden. For a time, the only apparent method available for the people to get their share of the profits, often imaginary, derived from the railway business, was by means of taxes. Hence special taxes of various kinds were devised. But as logical methods of control and regulation are being introduced, and as the records of investment, earnings and operating expense are being more intelligently studied, this fact is becoming apparent—that there is very little surplus left for taxes, particularly for the payment of a franchise tax, if a company is to furnish adequate service, properly maintain its property, provide for depre-

ciation due to renewals and obsolescence and pay even a moderate return on the investment so that needed extensions may be financed.

As legislatures can establish commissions which have power to regulate service, control operation and fix rates, there apparently is nothing left, under such conditions, of what has been termed "franchise value." In fact the term "indeterminate franchise" implies this very feature. Now if there is no franchise value, there should be no tax upon it. The burden of maintaining pavement is an inheritance from horse car days, when the horses used in hauling the street cars, actually wore out the pavement between the rails. And there is justly a growing sentiment toward the removal of this burden, providing of course that the money saved to the railway company is diverted to furnishing better service or toward offsetting some of the other legitimate expense of transportation.

Depreciation

There is much discussion as to setting aside each year out of earnings, some definite amount to offset the depreciation of the property due to obsolescence and other causes; and it is generally conceded that *this is a duty and necessity that can be no longer neglected*. What should be done with the past obligations of this nature which have accumulated through years of development of poor business, is a problem which is receiving much consideration, but there hardly have been sufficient decisions reached to outline a final conclusion or even to indicate a decided tendency.

Rate of Return

It is certain, however, that as all these requirements of successful and growing transportation systems are being more thoroughly analyzed and understood, that there is being developed a conclusion that the profits from the transportation business are, as a rule, no longer excessive; and the removal of the idea that a franchise for a street railroad in a center of population is "as good as a gold mine" is having a good effect toward reaching a sane solution of transportation difficulties. Money actually used to produce a property should be assured a fair rate of interest, and if private capital is to be attracted, an additional profit over current interest rates must usually be allowed varying in proportion with the hazard of the enterprise. It must be admitted, however,

that under conditions where the enterprise has become established, the fair rate of return considered necessary is approaching nearer and nearer toward just the interest charge at current rates: and the surplus earnings are being called upon to satisfy the demands for extensions, for effective maintenance and for reserve to cover depreciation.

The rate of interest is being reduced in some places by raising money for rapid transit systems by means of city credit, but in these cases, the furnishing of the money required for equipment and for the operation of the system has been left to private capital. In other cases, as in Chicago, the actual investment in the surface street railway system has been determined by appraisal and an exact accounting of the expenditures for rehabilitation, betterments and extensions has been made. Thus in Chicago, on the total investment, there has been allowed a return of five per cent, plus a share of the profits, amounting to forty-five per cent of the net earnings, the other fifty-five per cent going to the city. In other cities where the relation between the investment and the return has not been so carefully determined, there is a tendency either to force a reduction of the rate of fare or to complain of the service rendered. It also must be recognized that if some method were available absolutely to keep the operation of the road "out of politics," there would be a decided tendency in some cities toward municipal ownership and municipal operation.

Conclusion

It will be seen from the foregoing that any attempt to formulate decisions of a hasty or prejudicial nature would very likely fall far from the truth and that a coherent solution of the problem requires analysis from many viewpoints and by various minds.

The patron should learn to recognize that empty seats cost as much to operate as occupied seats, that a seat for every passenger during the rush hours must mean the curtailment of the service during the non-rush hours, and that new cars and new tracks cannot be furnished until old equipment has been in service a reasonable length of time.

The operator should adopt the policy of continually trying to please the public and should arrange his schedule and routes to accommodate the greatest number. If the best service can be

rendered by establishing through routes and giving transfers, these methods should be adopted in an effort to increase gross earnings by making it easy to ride. *It should be realized that publicity of intention and results is the best policy.*

The City should co-operate with the company on street traffic regulation, widening the streets where necessary and issuing permits for extensions and new connections which are absolutely necessary for the best routing system. Unnecessary taxes and the burden of pavement maintenance should be removed in the interest of allowing more money for better service.

The property owner should recognize that the general prosperity of the entire district is not only vital to him but to others, and that routes and extensions cannot be controlled for his particular benefit.

The financier must realize that the day for exploitation of established enterprises has passed, and that the fixed charges on such properties must be reduced to a fair return on the actual investment. New capital which is absolutely necessary for the continued life and usefulness of any public utility must be furnished, and this flow of new blood should be supplied in advance of actual needs, if it is to have a strengthening influence on the system.

Economy and a continuation of an equitable balance dictates efficient management, and the setting aside out of earnings each year, of a fund to provide for renewals.